



Mega salmon factory stays cool

The world market for salmon products grows steadily. In line with this economic development, also the capacities of the meanwhile largest fish cannery for the processing of salmon grew so that its area now comprises 95,000 m²/1,022,572 ft². The cooling of manufacturing, order-picking and storage areas takes place with refrigeration components from Güntner.

The production area of the mega salmon factory at the Polish coast of the Baltic Sea was most recently expanded by 8,500 m²/91,493 ft², unlocking additional processing capacities. Approx. 3,000 employees now process more than 60,000 tonnes/66,120 short tons of fresh fish per year – smoked and marinated salmon specialties, ready-to-cook wet or frozen salmon and speciality foods. The classical salmon product portfolio of the site was additionally expanded by the new production lines sushi and fish soup. According to the company, the site is the largest, technologically most advanced and most efficient salmon processing plant in the world.

Efficient production

40 % of the fresh raw fish comes from own salmon farms in Scotland and Norway, thus ensuring a high level of supply security and stable prices. The fresh salmon, gutted already in the producer countries, is processed, packed and picked to order within



Overview

Business line:	Food and Beverage
Application:	Fish Product Cooling
Country:	Poland
Fluid:	NH ₃ /35 propylene glycol
Product:	Unit cooler CUBIC Vario AGHN Blast freezer AGFN Air cooler CUBIC Vario GGHN Air cooler DUAL Vario DGN Air cooler GCO

Güntner GmbH & Co. KG
Hans-Güntner-Straße 2 – 6
82256 FÜRSTENFELDBRUCK
GERMANY
www.guentner.eu

Member of Güntner Group





▲ Following the most recent expansion of the production area of the mega salmon factory by 8,500 m²/91,493 ft², over 60,000 tonnes/66,120 short tons of fresh fish are processed at the site every year.



▲ The Güntner air coolers CUBIC Vario, type GGHN, are made of stainless steel and are HACCP-certified by TÜV Süd.

24 hours in the highly automated and tightly scheduled production. No fish waste is produced in the plant as the fish is completely processed. Only parts unfit for human consumption are sold to the animal food industry.

All manufacturing and packing rooms are cooled down to 10 °C to 12 °C/50 °F to 53.6 °F during production times while the fish keeps its core temperature of at least 7 °C/44.6 °F.

Smoking for export

Using wood collected from the beach, the salmon is smoked on tray racks in in-house developed smokehouses – either cold at 28 °C/82.4 °F or hot at 67 °C/152.6 °F for spiced dishes. The fillets are then sliced using salmon slicers, weighed and manually arranged on tray racks. The last step is packing the individual salmon trays in vacuum. Fresh, ready-to-cook salmon is cut into portions fully automatically before it is cooled to its storage temperature and wrapped.

Marinated salmon on the other hand matures for 24 hours at 10 °C to 12 °C/50 °F to 53.6 °F prior to portioning and packaging. The quality of the produce is tested in an in-house laboratory to ensure hygienic production. The production rooms are equipped with Güntner air coolers carrying the HACCP certificate to achieve the maximum hygiene standard.

Remodelling and expansion of cold air supply equipment

In the course of the most recent remodelling for the expansion of manufacturing facilities, also the cold air supply in the power house of the first construction section was adjusted to the new dimensions. For this, the existing plant engineering was expanded accordingly.

The machine room was remodelled and the production was expanded during running operations. The deadlines for all tasks were very tight so that Güntner had to deliver the components just-in-time. Any delay in the construction works resulted in changes regarding construction logistics followed by change requests to Güntner's flexible Manufacturing Department.

Two parallel multi-compressor racks operated with ammonia are installed in the machine room. Each two single-stage piston compressors and a screw compressor form a combined compressor installation connected in series. The piston compressors supply the base load (514 kW/1,754 MBTU/h per unit) whereas both screw compressors provide the cold for peak loads (using a variable frequency drive) for their consumers in line with demand.

In the low-temperature zone, ammonia hot gas flows in separate pipes to defrost the air coolers (coil and inner tray). In the long run, this defrost type has proven more viable from an economic point of view than the electric defrost type – despite higher investment costs.

The heat from the machine room that cannot be used economically is dissipated to the environment via two evaporative condensers (with each 2,520 kW/8,599 MBTU/h of condensation capacity) as well as air-cooled condensers.

Güntner NH₃ direct evaporators

Rooms with temperatures below the freezing point are cooled by ammonia direct evaporators from Güntner – these rooms are the low-temperature storage and freezing rooms (-25 °C/-13 °F) and a pre-cooling room (-8 °C to -15 °C/17.6 °F to 5 °F). All cold areas from 0 °C/32 °F upwards are supplied via secondary glycol circuits and Güntner air coolers respectively. These areas are, for example, the storage, ripening, order-picking, packing and processing rooms. In these cases, the flow temperature of the 35 % propylene glycol is 8 °C/ 46.4 °F.

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▲ Stainless steel is the material of choice for air coolers operated in fish processing applications as metals are exposed to salt aerosols as well as smoke and are thus much more vulnerable to corrosion.

The storage and ripening rooms are temperature-controlled; the values here range from the freezing point to 4 °C/39.2 °F. The room temperature of the manufacturing areas is between 10 °C and 12 °C/50 °F and 53.6 °F.

The Güntner NH₃ direct evaporators for deep-freeze applications operate in flooded pump operation with an evaporating temperature of -42 °C/-43.6 °F. In the LT storage rooms, Güntner CUBIC Vario AGHN direct evaporators provide a constant and evenly distributed storage temperature of -25 °C/-13 °F, and Güntner AGFN blast freezers and high-capacity Güntner GCO heat exchangers are in operation to freeze batches of different size.

All deep-freeze direct evaporators are equipped with an insulated tray and a special fan ring heater that allow for short and efficient defrosting cycles and thus high operational reliability and constant temperatures at any time.

Glycol as coolant for Güntner air coolers

74 Güntner GGHN CUBIC Vario units (using 35 % propylene glycol as coolant) are installed in the over 1,000 m²/10,764 ft² ripening, storage, packing and order-picking rooms of the newest construction section.

Separate climatisation coils of the air coolers provide need-based and reliable dehumidification of the room air. This is necessary particularly after the daily cleaning and disinfection interval as the basic ventilation of the rooms is not sufficient for dehumidification. The humid room air is cooled in the air cooler, thereby dehumidified and then heated again to the target temperature using warm brine. With this drying function integrated in the air cooler, every room can be set individually to the desired relative humidity.

Güntner GGHN CUBIC Vario units are installed in the following rooms, to name but a few: In the 0 °C/32 °F storage rooms for raw material, co-products and hot smoked or fresh fish, in chilling rooms and in the 10 °C/50 °F rooms for vacuum packaging (VAC), packaging with modified atmosphere (MAC) and palletising, and in the trolley unloading and loading rooms. The Güntner CUBIC Vario units, type GGHN, are equipped with Güntner Streamers that reliably increase the air throw and thereby effectively prevent heat pockets.

These GGHN units are also installed in the different ripening rooms for salmon which is either cold smoked or marinated with dill or pepper. The units cool these rooms down to between 0 °C and 4 °C/32 °F and 39.2 °F. There are ripening rooms for every fish product for sensory reasons.

Draught-reduced Güntner DUAL Vario brine air coolers, type DGN, with horizontal air discharge are installed in the Manufacturing Department where employees work on assembly lines or machines. These HACCP-certified air coolers maintain a temperature of 10 °C/50 °F in the processing rooms.

Corrosion protection concept

The brine air coolers have a special corrosion protection to effectively withstand the salty and smoky aerosols and the aggressive alkaline and acidic cleaning agents (e.g. designed in stainless steel, either fully or in part, or equipped with powder-coated casings, fins and trays). Stainless steel is the material of choice for air coolers operated in fish processing applications as metals are exposed to salt aerosols as well as smoke and are thus much more vulnerable to corrosion.

This is why the air coolers' casings, trays/drip plates and pipes are made of V2A steel, and the fins of all air coolers are epoxy resin-coated. All other visible structural parts of the cold air supply equipment that are not insulated (e.g. pipes and fittings) are made of stainless steel.

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Plate heat exchangers for heat recovery

Eight heat exchangers (PHEs) serve as interfaces between the individual fluids ammonia, propylene glycol/water and water, and their different heat levels respectively. Ammonia (30 °C/86 °F) heats up the 35 % propylene glycol circuit from 10 °C to 20 °C/ 50 °F to 68 °F via a plate heat exchanger, and a water circuit from 8 °C to 23 °C/ 46.4 °F to 73.4 °F via a second PHE. Other raw water is heated from 5 °C to 20 °C/ 41 °F to 68 °F by means of NH₃ and, in a second step, flows in the opposite direction to the NH₃ flow. The water thereby heats up to 30 °C/86 °F whereas the ammonia cools down in the counterflow arrangement. Here, the PHEs act as fluid subcooler and as ammonia condenser respectively.

Another plate heat exchanger is used as superheater: NH₃ at 70 °C/158 °F is pumped in the opposite direction of pre-heated water circuit and thereby cooled down to 35 °C/ 95 °F. The water (23 °C/73.4 °F) already pre-heated in the counterflow arrangement is heated to 33 °C/91.4 °F also by means of NH₃. The hot water provided by the plate heat exchangers is used to clean the production rooms and to heat the offices and staff rooms.

Plate heat exchangers are also used as oil coolers of the screw compressors, and their heat is used to heat water as well. The water/propylene glycol mixture heated in the machinery room is used to defrost the Güntner air coolers installed in the 0 °C/32 °F rooms and to prevent the soil from freezing in the -25 °C/-13 °F low-temperature storage rooms.